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F2S SCF S702 S707
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GB 2277918 A   US 5141203 A

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ONLINE: EDOC, WPIL

(54) **An adjustable engine mounting device with built-in screw jack**

(57) An adjustable engine, eg a marine engine, mounting device comprises an anti-vibration mount 4, having a resilient material 15 located between upper and lower frusto-conical portions 10, 12, and a screw jack 28. The jack 28 raises the engine mounting, 2 to allow insertion of packing shims 40 into a gap (G, fig 3) between a base portion 8 and bearer 6, thereby aligning the engine with, for example, a propeller shaft. A socket spanner is engaged with a square section 34 on the jack 28 in order to cause head 32 to contact the bearer 6. In one arrangement fine adjustment can be made by using a larger diameter portion of the jack 28 within an integral threaded part of the device.

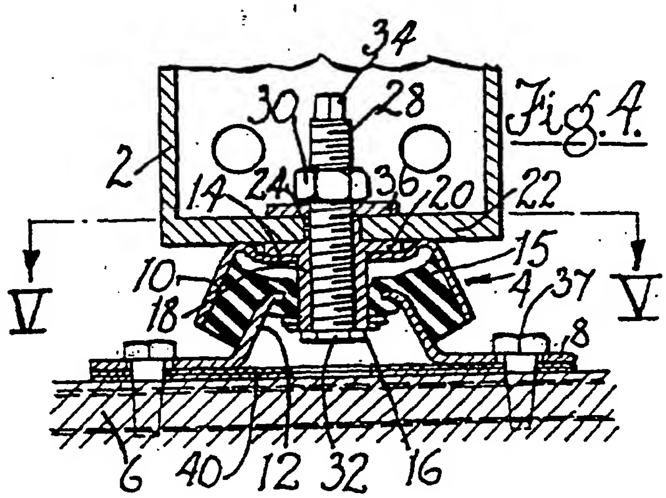

Fig.4.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

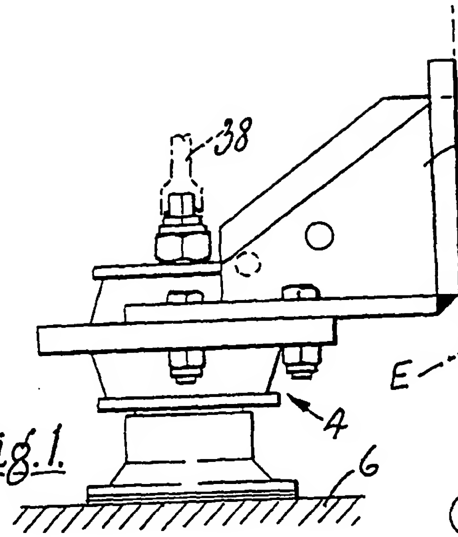


Fig. 1.

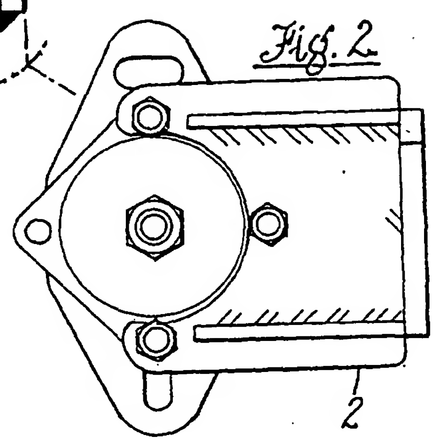


Fig. 2.

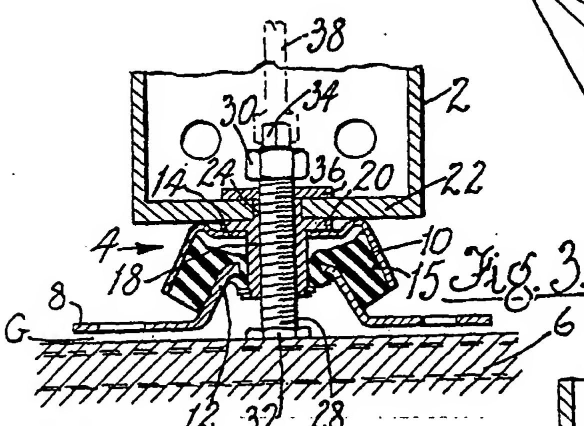


Fig. 3.

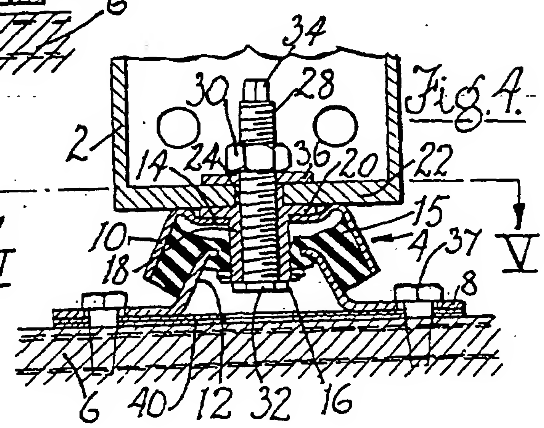


Fig. 4.

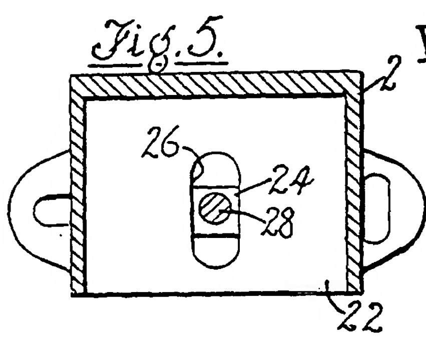
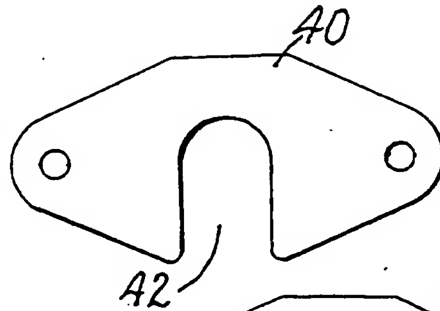


Fig. 5.

Fig.6.



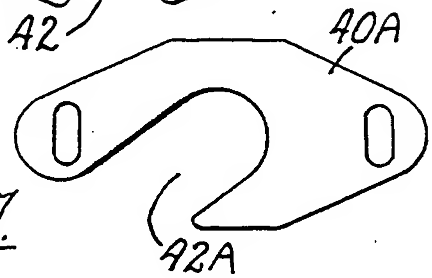


Fig.6A.

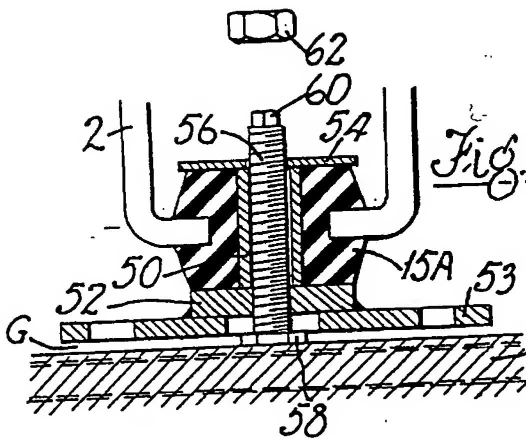


Fig.7.

Fig.8.

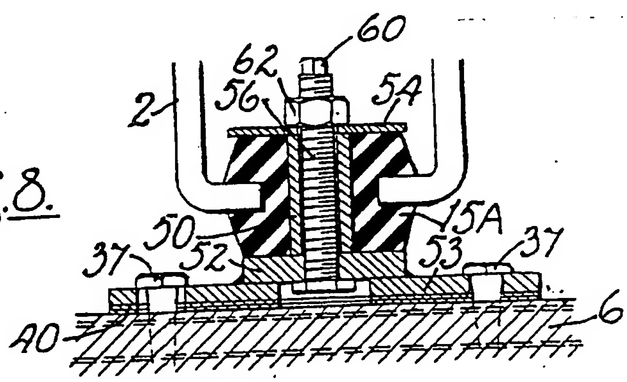


Fig.9.

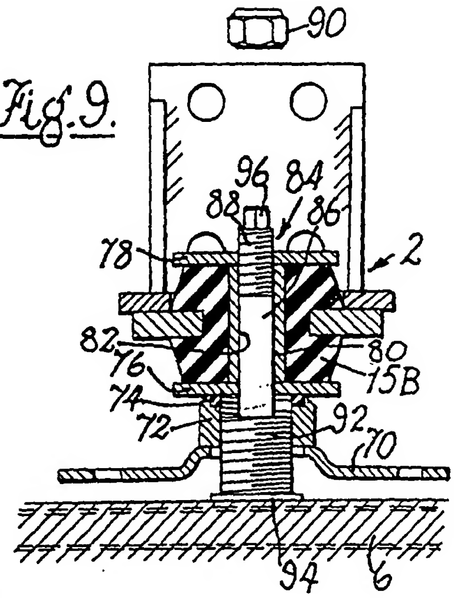


Fig.10.

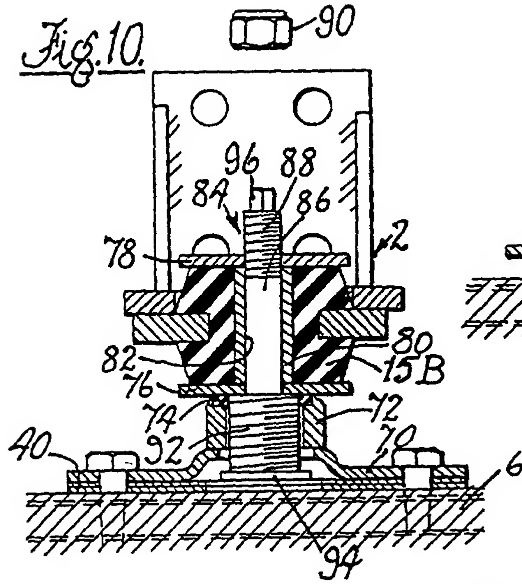


Fig.12.

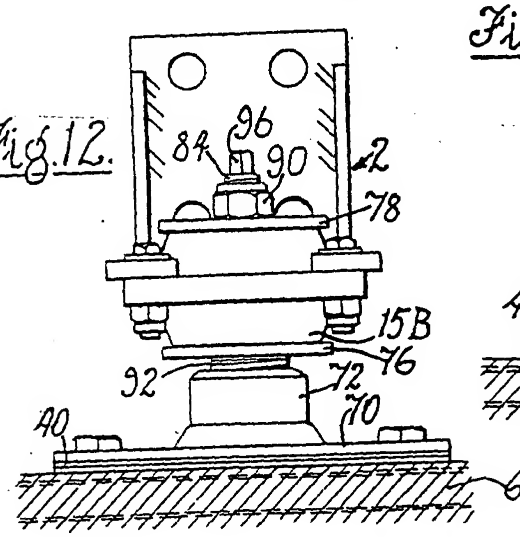
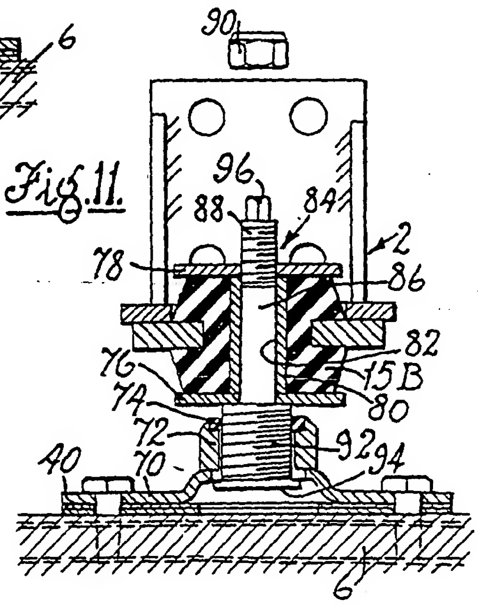


Fig.11.



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AN ENGINE MOUNTING DEVICE

This invention relates to devices for resiliently mounting engines and is particularly, but not exclusively, concerned with such mounts for marine engines.

Marine engines are commonly mounted on anti-vibration mountings and re required to be aligned in relation to the axis of the propeller shaft of the marine craft during installation in the vessel.

It is known to accomplish adjustment of the vertical disposition of the engine and its mounting bracket in several ways.

One method involves the use of shims located beneath the base of each anti-vibration mount. Although this method is found to be very reliable in service, it is time consuming as the engine has to be lifted, often by crane, to allow the insertion of the shims.

Another method utilises a vertical stud extending upwardly from the anti-vibration mount and adjusting nuts threaded on the stud above and below the engine bracket. This method is quick and convenient in many circumstances during installation, but it is found in practice that the stud is liable to fracture in service due to fatigue caused by it having to carry a fluctuating bending load imparted thereto due to propeller thrust. This failure is initiated at the root of the thread which forms an unavoidable stress raiser. Failure is particularly common if the installer makes use of the full adjustment, when the maximum length of stud is exposed between the engine mounting bracket and the anti-vibration mount.

In some cases a threaded spigot is secured to the upper face of the anti-vibration mount and a hexagonal height adjustment collar is screwed onto that spigot. A vertical stud, as just described, is used to carry a locking nut and clamps the engine mounting bracket between that nut and the hexagonal height adjusting collar. This system is reliable in service as the central vertical stud is only required to provide a clamping force. However, the hexagonal adjusting collar requires a large spanner, the manipulation of which is difficult or impossible in the confined space between the engine and the hull of the vessel.

According to one aspect of the invention there is provided an anti-vibration

mounting device incorporating a body of resilient material, particularly for use with a marine engine, comprising a base portion to be removably secured to a bearer, means for securing an engine bracket to the device, and a jacking screw engaged in an internally threaded member of the device for jacking the device vertically with respect to the bearer to allow insertion of shims between the base portion and the bearer.

According to another aspect of the invention there is provided an anti-vibration mounting device according to claim 1, wherein the jacking screw is formed at its lower most end portion with a head to bear on the bearer during a jacking operation.

Such a device can provide ready heightwise adjustment of the engine, can be reliable in service and can be readily accessible during installation.

The lowermost end portion of the jacking screw may be formed with a head to bear on the bearer during the jacking operation and the uppermost end may be formed with a number of flat surfaces for engagement by a wrench or socket spanner.

A locking nut may be provided on the jacking screw to maintain the screw in a withdrawn position after disengagement from the bearer and/or to clamp the device and the engine bracket together.

The shims may comprise flat plates formed with a horseshoe shaped opening to pass around the jacking screw upon insertion beneath the base portion.

In one form the internally threaded member has an upstanding non-circular, e.g. square, section portion which fits closely within a complementary opening formed in the engine bracket.

In another form of the invention the internally threaded member is integral with the base portion of the device.

The anti-vibration mounting device may include in one form, a lower plate-like member formed with a central frusto-conical portion, and upper portion having a larger frusto-conical portion and a body of resilient material located between the two portions. The resilient material may be vulcanized to one or both portions.

In a further form of the invention a plate member may be partly embedded within the resilient material and extend outwardly therefrom and secured to the mounting bracket, or part of the engine bracket itself may be embedded within the

resilient material.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a side elevation of a first embodiment of an anti-vibration mounting device according to the invention;

Figure 2 is a plan view of the mounting device shown in Figure 1;

Figure 3 is a vertical sectional view of a second embodiment of an anti-vibration shown in an elevated position;

Figure 4 is a similar view to Figure 3, with shims inserted and an engine bracket clamped to the mounting;

Figure 5 is a sectional view on line V–V of Figure 4;

Figure 6 is a plan view of one form of a shim intended for use with the mounting devices;

Figure 6A is a plan view of an alternative form of shim;

Figures 7 and 8 are sectional views of a third embodiment of an anti-vibration mounting device according to the invention;

Figures 9, 10 and 11 are sectional views of the first embodiment in three different conditions of adjustment; and

Figure 12 is a front elevation of the mounting device shown in Figures 1, 2 9, 10 and 11 ready for service.

It is to be understood that for the sake of clarity, the engine is not shown fully in the drawings.

As seen in Figure 1 an engine E, indicated in chain line has securely bolted thereto a mounting bracket 2. The bracket 2 is in turn mounted on an anti-vibration mount 4 which is rigidly bolted to a bearer 6 located in part of the hull of a vessel.

One form of an anti-vibration mount 4 seen in Figures 3 to 5 comprises a base member 8 and an upper member 10. The base member 8 has a frusto-conically formed inner portion 12 and the upper member 10 is formed with a horizontal portion 14. A pad 15 of neoprene rubber or the like is vulcanized to form a bond with the upper face of the inner portion 12. The upper member 10 rests freely on the rubber pad 15, although it may be found convenient in some cases for it to be bonded to the

rubber pad 15.

An internally threaded sleeve 16 has a plain cylindrical portion 18 which passes vertically downwardly through the mount 4, a flange 20 which locates between the upper face of the horizontal portion 14 of the mount 4 and the lower face of a plate-like member 22 of the engine bracket 2, and an upwardly extending portion 24 above the flange 20 of square section as seen in plan, which square section portion 24 locates in a slot 26 in the plate-like member 22 as seen clearly in Figure 5.

A stud 28 is screwed from beneath into the sleeve 16 and the hexagon nut 30 is threaded onto the upper end of the stud as seen in Figures 3 and 4. The stud 28 is formed with a flat head 32 at its lower end and with a square head 34 at its upper end.

A plain washer 36 locates around the stud 28 above the plate-like member 22.

With the anti-vibration mounting 4 of Figures 3 to 5 attached to the engine bracket 2 as described and resting on the bearer 6 within the full of the vessel, vertical adjustment of the engine in order to effect alignment of the engine with the axis of the propeller shaft may take place as follows.

First, the locking nut 30 is unscrewed towards the top of the stud 28. Bolts 37 are unscrewed from the bearer 6, after which the stud 28 is rotated in a clockwise direction by means of a socket spanner 38, shown in chain lines in Figure 3, to cause the head 32 to engage the bearer 6 and raise the bracket 2 with the engine E to form a gap G between the base member 8 and the bearer 6.

Next, an appropriate number of shims 40 to 40A, shown in plan in Figures 6 and 6A are inserted in the gap G. It will be clear that the shims 40 and 40A are each formed with a horseshoe shaped gap 42 or 42A in order to allow the shims to pass around the stud 28 upon insertion. The stud 28 is then screwed in an anti-clockwise direction upwardly through the sleeve to allow the engine to be lowered and its full weight to be taken by the bearer 6 through the shims. The nut 30 is then screwed down onto the washer 36 in order to retain the stud 28 in its withdrawn, upward position and to clamp the resilient mounting 4 to the bracket 2 as seen in Figure 4. The bolts 37 are then firmly screwed back into the bearer B. The alternative form of shim 40A shown in Figure 6A has its horseshoe shaped slot 42A formed diagonally to provide ease of assembly in some circumstances.

It will be clear that the location of the square portion 24 within the slot 26 of the bracket 2 prevents any rotation of the sleeve 16 while the stud 28 is being rotated.

A further embodiment of the invention is shown in Figures 7 and 8. Parts of the engine mounting bracket 2 are embedded within and attached by vulcanization to a pad 15A of resilient neoprene rubber. A sleeve 50 having a plain cylindrical bore extends within the pad 15A between a lower member 52 and a washer 54 located on the upper surface of the pad 15A. The lower member 52 is secured, e.g. by welding, on the upper surface of a base plate 53 and has an internally threaded aperture 53 therein.

A jacking screw 56 passes freely through the bore in the sleeve 50 and is threaded through the aperture 55. The jacking screw 56 is formed with a head 58 at its lowermost end, and with a square had 60 at its upper end. A nut 62 can be screwed onto the jacking screw 56 as seen in Figure 8.

Initially the jacking screw 56 is screwed upwardly to the lower member 52 and retained there by the nut 62 as seen in Figure 8 before affixing the bracket 2 to the engine.

After temporarily seating the base plate 53 on the bearer 6 within the hull of a vessel, the engine is elevated to align it with the propeller shaft by rotating the jacking screw 56 to cause its head 58 to bear upon the bearer 6. the anti-vibration mounting, the bracket 2 and consequently the engine are raised to the condition shown in Figure 7. An appropriate number of shims 40 or 40A may then be inserted between the plate 53 and the bearer, as previously described and as seen in Figure 8.

The jacking screw 56 is then rotated to raise the head into contact with the underside of the lower member 52 and the nut 62 is screwed down onto the washer 54 to retain the screw in its withdrawn condition and to secure the mount to the lower member 52. The retaining bolts 37 are then screwed through holes in the base plate 53 into the bearer 6 to fix the engine and its mount in its heightwise required position.

In the embodiment shown in Figures 9 to 12, not only are shims used for adjusting the heightwise initial setting of the mounts and engine, but further fine adjustment is possible by screw means.

In this arrangement a base plate 70 has fixed to it an internally threaded static

nut 72 which is provide with a "NYLOC" insert 74. An anti-vibration pad 15B is located between a lower member 76 and a washer 78, while part of the engine mounting bracket assembly 2 is fixed, by vulcanization, to the pad 15B.

Between the base member 76 and the washer 78 extends a plain cylindrical sleeve 80, which has a plain unthreaded bore 82.

A jacking screw 84 has a plain cylindrical portion 86 which is freely rotatable within the bore 82, an upper portion 88 which is threaded in order to receive a lock nut 90 and a lower portion 92 of larger diameter than the other portions and which is threaded to fit within the nut 72. The lower portion has a head 94 and a square head 96 is formed on the upper end of the threaded upper portion 88.

In use the nut 90 is removed from the threaded upper portion 88 and the jacking screw 84 is rotated by means of the socket spanner 38 as in the previous embodiments, the threaded portion 92 rotating in the static nut 72, so that as the head 94 bears on the bearer 6, the base plate 70 with the nut 72 and anti-vibration mounting are all elevated as seen in Figure 9 to allow for the insertion of an appropriate number of shims 40 or 40A before lowering and bolting of the assembly to the bearer, as seen in Figure 10.

Further fine adjustment may then be made by rotating the screw 86 to raise it through the nut 72 to the position shown in Figures 11 and 12, where a shoulder at the upper end of the enlarged lower portion 92 engages and supports the lower member 76, and the screw threaded portion 92 enters into the "NYLOC" insert 74. The nut 90 is then screwed down onto the washer 78 to retain the mount in its locked heightwise position and to secure the mount firmly to the jacking screw 84.

Although the various embodiments of the invention are shown and described with reference to a single anti-vibration device, it must be understood that there are several mounting points for an engine and each of these points will comprise an anti-vibration device of one of the types described.

Thus it is found that the alignment of the engine unit with the propeller shaft may be readily and simply adjusted inboard of the hull of the vessel notwithstanding any close proximity of the hull or other components therein.

CLAIMS

1. An anti-vibration mounting device incorporating a body of resilient material, particularly for use with a marine engine, comprising a base portion to be removably secured to a bearer, means for securing an engine bracket to the device, and a jacking screw engaged in an internally threaded member of the device for jacking the device vertically with respect to the bearer to allow insertion of shims between the base portion and the bearer.

2. An anti-vibration mounting device according to claim 1, wherein the jacking screw is formed at its lower most end portion with a head to bear on the bearer during a jacking operation.

3. An anti-vibration mounting device according to claim 1 or claim 2, wherein the uppermost end portion of the jacking screw is formed with a plurality of flat surfaces to be engaged by a wrench or socket spanner.

4. An anti-vibration mounting device according to any one of claims 1 to 3, including a locking nut threadable onto the jacking screw to maintain the jacking screw in a withdrawn position after disengagement from the bearer and/or to clamp the device and the engine bracket together.

5. An anti-vibration mounting device according to any one of the preceding claims, wherein shims inserted between the base portion and the bearer comprise flat plates formed with a horseshoe shaped opening to pass around the jacking screw upon insertion beneath the base portion.

6. An anti-vibration mounting device according to any one of the preceding claims, wherein the internally threaded member is formed with an upwardly extending non-circular section portion to fit closely within a complementary opening formed in the engine bracket.

7. An anti-vibration mounting device according to any one of the preceding claims, wherein the device comprises a lower plate-like member formed with a central frusto-conical portion, an upper portion having a larger frusto-conical portion and the body of resilient material located between the lower and the upper frusto-conical portions.

8. An anti-vibration mounting device according to claim 7, wherein the body of resilient material is vulcanized to at least one of the frusto-conical portions.

9. An anti-vibration mounting device according to any one of claims 1 to 5, wherein the internally threaded member is integral with the base portion of the device.

10. An anti-vibration mounting device according to any one of claims 1 to 6, wherein a plate member is partly embedded within the body of resilient material and extends outwardly therefrom and is secured to the engine bracket.

11. An anti-vibration mounting device according to any one of claims 1 to 6, wherein part of the engine bracket is embedded within the resilient body.

12. An anti-vibration mounting device according to any one of claims 1 to 5, wherein the jacking screw comprises an upper screw threaded portion, an intermediate plain cylindrical portion and a lower screw threaded portion of greater diameter than the other portions, the lower portion is rotatable within the internally threaded member which is formed as a captive nut integral with the base portion, the upper screw threaded portion is capable of threaded engagement by a locking nut and the intermediate plain cylindrical portion is freely rotatable within a plain sleeve located within the body of resilient material, such that rotation of the screw in one direction will cause the entire mounting device to be raised with respect to the bearer, and rotation of the screw in the opposite direction can cause the resilient mounting and the engine bracket to be raised further with respect to the base portion.

13. A method of resiliently mounting an engine, particularly a marine engine, comprising attaching an engine mounting bracket to the engine and to an anti-vibration mounting device, locating the device on a bearer, raising the device and thereby the engine by means of a jacking screw engaged with an internally threaded member of the device to raise the device from the bearer by an amount greater than that necessary to align the engine with the propeller shaft of the vessel thereby to form a gap between a base portion of the device and the bearer, inserting shims to an appropriate height into the gap, lowering the device onto the shims by rotating the jacking screw and bolting the device to the bearer with the shims in position.

14. A method of resiliently mounting an engine according to claim 13, wherein fine adjustment of the heightwise position of the engine is made by rotating the jacking screw within the internally threaded member integral with the base portion of the device thereby to raise the device with respect to the base portion.

15. An anti-vibration mounting device particularly for use with a marine engine substantially as hereinbefore described and illustrated with reference to Figures 1 and 2 and 9 to 12.

16. An anti-vibration mounting device substantially as hereinbefore described and illustrated with reference to Figures 3 to 5.

17. An anti-vibration mounting device substantially as hereinbefore described and illustrated with reference to Figure 7 and 8.

The Patent Office

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Application No:	GB 9613816.9	**Examiner:**	Mike McKinney
Claims searched:	1 to 17	**Date of search:**	8 October 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F2S (SCF).

Int Cl (Ed.6): B63H 21/30; F16F 1/36.

Other: ONLINE: EDOC, WPIL.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2277918 A (OTIS)	
A	US 5141203 (BAKER)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.